How To Pass the Novice Examination*

Example Questions and Answers for the New Novice License Available July 1st

SAY, you would-be hams — got your sights set on the new Novice Class license? Good! Here's the dope on how to get it.

FCC has indicated that its field offices will be equipped to conduct Novice (and Technician — see box) examinations effective July 1st. Don't show up that morning at an FCC office, however, because it's a Sunday. But Monday morning FCC should be ready for business.

Any citizen of the United States is eligible to apply for the Novice license, except former holders of any class of amateur license (including DL and JA licenses, incidentally, issued by the U. S. military). The requirements are passing of a test in sending and receiving code at the rate of five words per minute, and a new simplified written examination. Exams may be taken at any of the regular FCC examining points. They may also be taken by mail under the usual conditions for old Class C (now Conditional Class) — i.e., eligible for examination by mail are applicants more than 125 miles airline from a point at which FCC conducts exams four times yearly or oftener; physically disabled persons unable to travel; and persons in the military service unable to appear for the examination.

The procedure? If you will appear for personal examination, write or visit the FCC Engineer-in-Charge of the district in which you live (for address, see the adjoining page) asking for a Form 610 (application for amateur operator and/or station license) and information on the exact date when exams will be held in the city at which you wish to appear.[1] Fill out the form and mail it back to the Engineer's office, and then appear at a specified time for personal examination. Or, if you are appearing at a district office where there are frequent examinations, simply fill out the form and take it with you. First the Engineer gives you your code test in receiving. The procedure is that you are required to copy "solid" for at least one minute out of about five minutes of test material. When that's done, you get the sending test, on the same basis. When you have passed both sending and receiving code tests, the Engineer gives you your written exam. Exams are now graded right in the field offices so you may learn immediately whether you passed. In any event, all papers go to Washington for issuance of licenses, which requires several weeks. If you fail, you have the privilege of taking the exam again after thirty days (any number of times if necessary).

If you are eligible for an examination by mail under the conditions specified above, here's what you do: Write your Engineer, asking him to send you the papers for a Novice Class license examination by mail. (If physically disabled, include a physician's certificate; if in the military service, include a certificate of the commanding officer attesting your inability to appear.) You will receive an application form and a sealed envelope containing a set of examination questions, as well as specific instructions on how to proceed. Before doing anything else, *read the instructions carefully.* You have to have yourself examined in code speed by some licensed operator with whom you have made an arrangement to that effect. He must be an Advanced or General Class (old A and B classes) licensee, or must have held within five years a license as a commercial radiotelegraph operator, or must have been employed within five years as a radiotelegraph operator in the service of the U. S. You also have to provide a witness who will open the envelope of questions and certify that you wrote out the answers without assistance. This may be the same person who gives you your code test, or someone else, but that person must be at least 21 years of age.

Now, what and how to study?

As for code, we can't go into detail here. Get yourself a copy of *Learning the Radiotelegraph Code* from ARRL (25¢). Or use the material in the *Handbook* or *How To Become a Radio Amateur.* Or get another ham to help you; also, if there is a local radio club, check to see if code classes are being conducted. Or use all methods!

* This information is a condensation of the material which appears in the revised and expanded twenty-seventh edition of *The Radio Amateur's License Manual* (50¢), being published by the ARRL.

[1] See page 23, January *QST*, which carries the examination schedule for the first half of 1951. The schedule for the second half of this year will appear in the July issue.

TECHNICIAN LICENSES

Technician Class licenses also become available after July 1st. In addition to the 5-w.p.m. code test, the applicant must pass the standard General Class (old Class B) written examination in regulations and theory. This study material is in *The Radio Amateur's License Manual.* The discussion herein on the procedure to be followed in applying for licenses, in person or by mail, applies also to Technician aspirants. As a matter of fact, one can apply for *both* Novice and Technician privileges simultaneously, taking the 5-w.p.m. code test and two written exams. It should be noted that the Technician Class license is a regular five-year ticket renewable upon showing of operating activity.

In any event, you certainly will want to make use of the excellent code-practice service available from the League Headquarters station, W1AW. Starting May 1st, W1AW began a schedule of slow-speed code practice transmissions commencing at 9:30 P.M. EST on Sundays, Tuesdays and Thursdays, and at 8 P.M. EST on Saturdays. These sessions start at five words per minute and progress over the period of about an hour through 7½, 10 and 15 w.p.m. (On other evenings of the week, code practice begins at 9:30 P.M. EST at speeds of 15 w.p.m. and up.) The frequencies: 1887, 3555, 7215, 14,100, 52,000 and 146,000 kc., all simultaneously. See page 70 of the April and May issues of *QST* for additional dope.

As for the written examination, FCC has now released a set of 28 questions which cover the field of knowledge in which the Novice applicant is expected to be prepared. These, with appropriate answers, will be detailed at the end of this article. The exam itself will consist of 20 questions selected from the material covered by the 28 examples, but not in the same form. They, like those on all present-day amateur written examinations, will be of the "multiple-choice" type, where several possible answers are already provided but only one is correct. For example, a question on the Novice Class examination might be:

> The maximum power input permitted in a station licensed to an amateur of the Novice Class is:
>
> a) one kilowatt
> b) 75 watts
> c) 1000 volts at 100 milliamperes
> d) whatever power is necessary to maintain communication
> e) not more than the maximum rating of the tubes

Of course, (b) is the correct answer. All you need do is indicate the correct answer. Obviously if you know your stuff it requires only a moment to mark down the right answer. If you don't, you're in for trouble. So be prepared. When you can answer all the example questions, and understand the basis of the answers, you're all set. Be sure to read the questions on the examination carefully before you answer; FCC finds many wrong answers obviously due to careless and hurried reading and some questions not answered at all because of carelessness.

When you get your ticket, you can go on the air under the provision for Novice privileges. You'll have a call different from the normal permutations. Although not officially decided at press time, it is expected that Novice calls in the continental United States will have WN prefixes.

Novice privileges are:

3700–3750 kilocycles — telegraphy (A-1)
26.96–27.23 megacycles — telegraphy (A-1)
145–147 megacycles — telegraphy (A-1, A-2), telephony (A-3, f.m.)

The transmitter must be crystal-controlled and the input must not exceed 75 watts.

By the way, it is quite possible to apply for both the Novice and Technician licenses simultaneously. You would then take the 5-w.p.m. code test, and both written examinations. If you pass both, you get two call signs, one a distinctive Novice call and the second a regular call for your Technician privileges. As a matter of fact, if your code is just about 13 w.p.m. (required for General Class) but you're not too sure of it, you may apply for both General Class and Novice Class at the same time (if eligible for both — i.e., if not a previous holder of amateur license). You would then take the 13-w.p.m. test. If you pass, fine, and you proceed to the written examinations. If you fail, you can immediately take a crack at the 5-w.p.m. test and your Novice written exam. As a Novice, you may visit any other amateur station and operate it, but only under the conditions specified for the Novice license. Any other amateur operator (except Technician Class) may visit your station and operate it, but only under the conditions specified for the Novice license.

And now — go to it!

But keep one thing constantly in mind. Your Novice license, when you get it, will be good for one year only. It may not be renewed. You may not obtain Novice privileges again at a later date. You have a one-year period of on-the-air practice to improve both your code and technical skills to a point where you can pass the General (or Conditional) or Technical Class exam. You must do that within the year or go off the air. So stick mostly to c.w. operation to bring that code speed up. Continue your study of theory and regulations. As soon as you are ready, preferably long before the end of your Novice term, take a crack at the exam for the higher-grade license. If you should fail the first time, you can try again each thirty days.

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Now to the example questions and answers. As stated, these are not the actual ones in the examination. However, they adequately cover the field of knowledge required. If you can answer these questions satisfactorily and understand the basis of the answers, you need have no fear of the written exam. Throughout your study you should keep in mind that these FCC examination questions are intended as a sampling of your knowledge in regulatory and technical fields. Like every other amateur, you must be at least generally familiar with other aspects of the amateur regulations, since they will apply equally to you as a Novice. Get yourself a copy of the complete amateur rules; they're available from the Government Printing Office, Washington, D. C., 15¢ — or in the *License Manual*, which has not only the complete regulations but detailed interpretations and explanations of them. In the technical field, you will also need to engage in collateral use of suitable elementary literature available at your local library, from the League, or on loan from an amateur acquaintance.

(The references in parentheses at the end of answers to regulatory questions are to appropriate sections of the amateur rules or the Communications Act.)

1. What is the maximum input power permitted to the final stage of the transmitter in a station licensed to the holder of a Novice Class license or operated by such an operator?

The maximum input power permitted a Novice is 75 watts. (§ 12.23)

2. What is the maximum penalty for a violation of the rules and regulations of the Federal Communications Commission?

A fine of up to $500 for each day during which the offense occurs, suspension of operator license, and revocation of station license. (Act, § 502)

3. On what frequency bands may the holder of a Novice Class license operate an amateur radio station?

3700–3750 kc.
26.96–27.23 Mc.
145–147 Mc.
(§ 12.23)

4. On what frequency bands may the holder of a Novice Class license operate an amateur radiotelephone station?

145–147 Mc. (§ 12.23)

5. What is the log of an amateur station, and what information is required to be entered therein? How long must it be preserved?

The log of an amateur station is the written record of transmissions. The log must show:

1) the date and time of transmission
2) the signature of each licensed operator operating thee quipment and the name of any person not holding a license who speaks over a radiotelephone transmitter
3) call of the station called
4) the input power to the transmitter
5) the frequency band used
6) the type of emission used
7) the location of the station at the time of transmission
8) the message traffic handled

Information such as the input power, frequency band, type of emission, location of station, need be entered only once provided the conditions are not changed. Similarly, entry of the date need not be repeated for other transmissions made on that date. If the station is mobile, the approximate geographic location can be indicated in the log.

The log of an amateur station must be preserved for at least one year following the last date of entry. Similarly, any message traffic handled must be kept on file for at least one year. (§ 12.136)

6. What is the term of an amateur Novice Class license? Under what conditions may this license be renewed?

The term of an amateur Novice Class license is one year. (§ 12.29)

It may not be renewed under any conditions. [§ 12.27(b)]

7. What are the rules and regulations regarding the transmission of improper language, false signals, or malicious interference?

The transmission of obscene, indecent or profane language, or of false or deceptive signals or call letters, or of malicious interference is expressly prohibited and there are heavy penalties for violation. (§§ 12.157, 12.158, 12.160)

8. What are the rules and regulations regarding purity and stability of emissions?

Below 144 megacycles, spurious radiations must be reduced in accordance with good engineering practice, and must not cause interference to near-by receivers of good engineering design not tuned to the transmitter. Voice modulation of a transmitter must not cause spurious emissions; the maximum modulation percentage is 100. Simultaneous frequency modulation and amplitude modulation is not permitted. The frequency of the signal transmitted must be as constant as the state of the art permits. (§ 12.133)

9. What method of frequency control is required to be used in the transmitter of a station licensed to the holder of a Novice Class license?

The frequency must be crystal-controlled. (§ 12.23)

10. What are the rules and regulations regarding the measurement of the frequencies of the emissions of an amateur radio station?

Regular measurement of the frequency of the transmitter is required. This measurement must be by means independent of the means used to control the transmitting frequency and must be of sufficient accuracy to ensure operation within the frequency band used. (§ 12.135)

11. Who may be permitted to operate the transmitter of an amateur radio station licensed to the holder of a Novice Class license?

Any amateur radio operator except of the Technician Class. (§ 12.28)

12. Under what circumstances may an amateur radio station be used by a person who does not hold a valid license?

A person not properly licensed may not *operate* an amateur station. However, he may speak over the microphone of an amateur radiotelephone station provided a duly-licensed operator is present to control the emissions. (§ 12.28)

13. What is the maximum permissible percentage of modulation of an amateur radiotelephone station?

One hundred per cent. (§ 12.133)

14. At what intervals must an amateur station be identified by the transmission of its call sign? May any transmission be made without identification of the station?

An amateur station must identify its call sign at the beginning and end of each transmission and at least every ten minutes if a single transmission lasts longer than ten minutes. No transmission by itself may be made without identification of the station, except that during a sequence of transmissions each less than three minutes long, the call sign needs to be given only once each ten minutes as well as at the beginning and end of the work. (§ 12.82)

15. Under what conditions is notice of portable or mobile operation required to be given, and to whom in each case?

Notice of intended portable operation, or mobile operation, must be given the FCC Engineer-in-Charge of the inspection district in which such portable or mobile operation is contemplated only when the operation is or is expected to be for a period longer than 48 hours. (§ 12.91)

16. What are the recognized abbreviations for: kilocycles, megacycles, Eastern Standard Time, Greenwich Mean Time, continuous wave, frequency modulation, amplitude modulation?

kilocycles — kc.
megacycles — Mc.
Eastern Standard Time — EST
Greenwich Mean Time — GMT
continuous wave — c.w.
frequency modulation — f.m.
amplitude modulation — a.m.

17. What is the relationship between a fundamental frequency and its second harmonic; its third harmonic, etc.?

The second harmonic is twice the frequency of the fundamental, the third harmonic is three times the fundamental frequency, and so on. A harmonic is always related to its fundamental frequency by an integral multiplier; i.e., 2, 3, 4, 5, 6, etc.

18. What is the relationship between a cycle, a kilocycle, and a megacycle?

1 kilocycle = 1000 cycles
1 megacycle = 1000 kilocycles = 1,000,000 cycles

19. What instrument is used to measure: electrical potential; electrical current; electrical power; electrical energy?

Electrical potential is measured by a voltmeter.

Electrical current is measured by an ammeter, milliammeter, or microammeter.

Electrical power is measured by a wattmeter.

Electrical energy is measured by a watt-hour meter.

20. What is the purpose of: a modulator; an amplifier; a rectifier; a filter?

A modulator is used to vary the amplitude, frequency or phase of the radio-frequency output of a transmitter for the purpose of transmitting information.

An amplifier is used to increase the amplitude, or power level, of a signal.

A rectifier is used to change alternating current into pulsating direct current.

The purpose of a filter is to attenuate undesired frequencies while simultaneously passing, without appreciable attenuation, a desired band of frequencies and/or direct current. (*Examples:* The power-supply "smoothing filter," which eliminates the alternating-current ripple from the output of a rectifier but permits direct current to flow with little or no attenuation; the "low-pass" filter, which attenuates all frequencies (such as harmonics in the output of a transmitter) above a given frequency but passes all lower frequencies.

21. What is meant by: amplification; modulation; detection; attenuation?

Amplification is the process of increasing the amplitude, or power level, of a signal.

Modulation is the process of varying the amplitude, frequency or phase of the radio-frequency output of a transmitter. Modulation is normally employed for the purpose of transmitting information. However, it may also occur inadvertently, as in the case of "hum" modulation of a signal resulting from ripple in the output of an insufficiently-filtered d.c. power supply.

Detection or demodulation is the process of extracting the information contained in the modulation on a radio-frequency signal.

Attenuation is a reduction in amplitude.

22. What is the purpose of: a radio-frequency choke; an audio-frequency choke; a filter choke?

The purpose of a radio-frequency choke is to oppose the flow of radio-frequency current while permitting direct current and audio frequencies to flow without appreciable opposition.

The purpose of an audio-frequency choke is to oppose the flow of audio-frequency currents while permitting direct current to flow.

The purpose of a filter choke is to aid in smoothing the direct-current output of a rectifier.

23. How is the actual power input to the tube or tubes supplying energy to the antenna of an amateur transmitter determined?

The input power is determined by measuring the direct-current plate voltage and the d.c. plate current to the tube or tubes in the final stage in the transmitter. The power input is equal to the plate voltage multiplied by the plate current in amperes. (*Example:* Two tubes in the final stage of the transmitter take 50 milliamperes each, at a plate voltage of 500 volts. The total plate cur-

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Novice Exam

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rent is $2 \times 50 = 100$ milliamperes, or 0.1 ampere. The power input is therefore $500 \times 0.1 = 50$ watts.)

24. Why are a rectifier and filter required in the plate power supply system of an amateur transmitter when operated from alternating current?

The amateur regulations require that an adequately-filtered plate supply be used on transmitters operating below 144 Mc. The rectifier is used to convert the alternating current into direct current. However, its d.c. output is pulsating, not constant, and the filter must be used to smooth out the pulsations so that the output is essentially "pure" — that is, free from pulsations or "ripple."

25. What is a frequency multiplier?

A frequency multiplier is a device that delivers output at an integral multiple (i.e., 2, 3, 4 times, etc.) of the applied frequency. The output of a frequency multiplier is consequently on a frequency that is a harmonic of the fundamental (applied) frequency.

26. What are the undesirable effects of overmodulation in radiotelephony?

Overmodulation results in the generation of spurious sidebands — that is, frequencies lying outside the band of frequencies or "channel" actually required for transmitting the information contained in the modulation. These spurious frequencies, called "splatter," will interfere with communication on near-by channels and may even lie outside an amateur band. At close range they may also cause interference with broadcast reception.

27. What is meant by a "parasitic" oscillation?

A parasitic oscillation is one not essential to the operation of the equipment and usually occurring on a frequency considerably removed from the operating frequency.

28. What is the purpose of a "key-click filter" and when should it be used?

The purpose of a key-click filter is to reduce spurious radiation generated when keying a radiotelegraph transmitter. It should be used whenever required for suppressing such spurious radiations.

— *J. H. & G. G.*

V.H.F. QSO Party

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a QSO counts 1 or 5 points. Cross-band work shall not count.

5) A "contestant" is a single operator working without the help of any other person. Results may be presented with names of all participating persons, for listing, but only single-operator scores will be considered for certificates.

6) Scoring: *1 point* for completed two-way section exchanges on 50 or 144 Mc.; *5 points* for completed two-way section exchanges on the higher v.h.f. bands. The sum of these points will be multiplied by the number of *different*

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